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DICTIONARY *of* ELECTRONICS

RUDOLF F. GRAF



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**MODERN
DICTIONARY
of
ELECTRONICS**

SEVENTH EDITION

REVISED AND UPDATED

Rudolf F. Graf



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bonding arrangement in the crystal structure. When added to a semiconductor crystal, it accepts an electron from a neighboring atom and thus creates a hole in the lattice structure of the crystal, making a p-type semiconductor. 2. An impurity from column III of the periodic table, which adds a mobile hole to silicon, thereby making it more p-type and accepting of electrons. Boron is the primary acceptor used to dope silicon (compare with *donor*).

acceptor circuit — 1. A circuit that offers minimum opposition to a given signal. 2. A circuit tuned to respond to a single frequency.

acceptor impurity — See *acceptor*.

acceptor-type semiconductor — A p-type semiconductor.

access — 1. To gain access to a computer's memory location in which binary information is already stored or can be stored. 2. To open up a set of connections to allow reading from or writing into this location.

access arm — In a computer storage unit, a mechanical device that positions the reading and writing mechanism.

access code — 1. The preliminary digit or digits that a telephone user must dial to be connected to a particular outgoing trunk group. 2. A group of characters or numbers that identifies a user to a computer or any other secure system. 3. One or more numbers and/or symbols that are keyed into the repeater with a telephone tone pad to activate a repeater function, such as an autodial.

access control — 1. The control of pedestrian and vehicular traffic through entrances and exits of a protected area or premises. 2. The process of limiting access to resources of a system to only authorized users, programs, processes, or other systems.

access grant — Multiprocessor system response that satisfies a previous service request.

access hole — A hole drilled through successive layers of a multilayer board to gain access to a land or pad location on one of the inside layers.

access method — 1. A data-management technique available for use in transferring data between the main storage and an input/output device. 2. A software component of a computer operating system that controls the flow of data between application programs and either local or remote peripheral devices.

access mode — 1. A technique used in COBOL to obtain a specific logic record from, or to place it into, a file assigned to a mass storage device. 2. The operation of an alarm system such that no alarm signal is given when the protected area is entered; however, a signal may be given if the sensor, annunciator, or control unit is tampered with or opened.

accessory card — An additional circuit card that can be mounted inside a personal computer and connected to the system bus.

access protocol — A defined set of procedures that function as an interface between a computer user and a network, enabling the user to employ the services of that network.

access provider — Telecommunications company that links businesses and individuals to the Internet using modem devices, high-speed ISDN lines, or dedicated links.

access time — Also called waiting time. 1. The time interval (called read time) between the instant of calling for data from a storage device and the instant of completion of delivery. 2. In a memory system, the time delay, at specified thresholds, from the presentation of an enable or address input pulse until the arrival of the memory data output. 3. The time required for a computer to move data between its memory section and its

CPU. 4. A time interval that is characteristic of a storage device. Essentially, it is a measure of the time required to communicate with that device, or, more specifically, it is the time between the application of a specified input pulse (assuming that other necessary inputs are also present) and the availability of valid data signals at an output. The access time can be defined only with reference to an output signal. 5. The time required by a computer to begin delivering information after the memory or storage has been interrogated. 6. The time it takes a computer to retrieve a piece of information. With hard disks or compact discs, maximum access time is measured as the time it takes to move from one end of the disk to the other, find a piece of information, and transfer that information to RAM.

accidental jamming — Jamming caused by transmission from friendly equipment.

ac circuit breaker — A device that is used to close and interrupt an ac power circuit under normal conditions or to interrupt this circuit under faulty or emergency conditions.

accompanying audio (sound) channel — Also known as co-channel sound frequency. The rf carrier frequency that supplies the sound to accompany a television picture.

ac component — In a complex wave (i.e., one containing both ac and dc), the alternating, fluctuating, or pulsating member of the combination.

accordion — A type of contact used in some printed-circuit connectors. The contact spring is given a z shape to permit high deflection without excessive stress.

ac-coupled flip-flop — A flip-flop that changes state when triggered by the rise or fall of a clock pulse. There is a maximum allowable rise or fall time for proper triggering.

ac coupling — Coupling of one circuit to another circuit through a capacitor or other device that passes the varying portion but not the static (dc) characteristics of an electrical signal.

accumulation key — In a calculator, it automatically accumulates products and totals of successive calculations.

accumulator — 1. In an electronic computer, a device which stores a number and which, on receipt of another number, adds the two and stores the sum. An accumulator may have properties such as shifting, sensing signals, clearing, complementing, etc. 2. A chemical cell able to store electrical energy (British). Also called secondary cell. 3. The "scratch pad" section of the computer, in which arithmetic operations are carried out. 4. A register and related circuitry that hold an operand for arithmetic and logic operations. 5. A register or latch internal to the MPU where data is stored temporarily before being sent to another location internal or external to the MPU chip.

accuracy — 1. The maximum error in the measurement of a physical quantity in terms of the output of an instrument when referred to the individual instrument calibration. Usually given as a percentage of full scale. 2. The quality of freedom from mistake or error in an electronic computer, that is, of conformity to truth or to a rule. 3. The closeness with which a measured quantity approaches the true value of that quantity. (See true value.) 4. The degree to which a measured or calculated value conforms to the accepted standard or rule. 5. The measure of a meter's ability to indicate a value corresponding to the absolute value of electrical energy applied. Accuracy is expressed as a percentage of the meter's rated full-scale value. To be meaningful, accuracy specifications must always consider the effects of time, temperature, and humidity. 6. Confidence in the correlation between measurements in one location and another,

character or set of characters. 3. Within a code set, a character intended to initiate, modify, or stop a control function.

control characteristic—1. A plot of the load current of a magnetic amplifier as a function of the control ampere turns for various loads and at the rated supply voltage and frequency. 2. The relationship between the critical grid voltage and the anode voltage of a tube.

control circuit—See control.

control circuits—In a digital computer, the circuits that carry out the instruction in proper sequence, interpret each instruction, and apply the proper commands to the arithmetic element and other circuits in accordance with the interpretation.

control-circuit transformer—A voltage transformer utilized to supply a voltage suitable for the operation of control devices.

control-circuit voltage—The voltage provided for the operation of shunt-coil magnetic devices.

control compartment—A space within the base, frame, or column of a machine used for mounting the control panel.

control counter—In a computer, a device that records the storage location of the instruction word to be operated on following the instruction word in current use.

control current—Current that occurs in the control circuit when control voltage is applied.

control data—In a computer, one or more items of data used to control the identification, selection, execution, or modification of another routine, record file, operation, data value, etc.

CONTROL DATA or Control Data—A trademark and service mark of Control Data Corporation in respect to data processing equipment and related services.

control electrode—An electrode on which a voltage is impressed to vary the current flowing between other electrodes.

control field—In a sequence of similar items of computer information, a constant location where control information is placed.

control-flow machine—A parallel-processing architecture with a single central sequence of instruction, carried out by many processors.

control grid—The electrode of a vacuum tube, other than a diode, upon which a signal voltage is impressed to regulate the plate current.

control-grid bias—The average direct-current voltage between the control grid and cathode of a vacuum tube.

control-grid plate transconductance—The ratio of the amplification factor of a vacuum tube to its plate resistance, combining the effect of both into one term.

controlled avalanche—A predictable, nondestructive avalanche characteristic designed into a semiconductor device as protection against reverse transients that exceed its ratings.

controlled-avalanche device—A semiconductor device that has very specific maximum and minimum avalanche-voltage characteristics and is also able to operate and absorb momentary power surges in this avalanche region indefinitely without damage.

controlled-avalanche silicon rectifier—A silicon diode manufactured with characteristics such that, when operating, it is not damaged by transient voltage peaks.

controlled-carrier modulation—Also called variable-carrier or floating-carrier modulation. A modulation system in which the carrier is amplitude modulated by the signal frequencies, and also in accordance with the

control characteristic — control section

envelope signal, so that the modulation factor remains constant regardless of the amplitude of the signal.

controlled-impedance cable—Package of two or more insulated conductors in which impedance measurements between respective conductors are kept essentially constant throughout the entire length.

controlled rectifier—1. A rectifier employing grid-controlled devices such as thyatrons or ignitrons to regulate its own output current. 2. Also called an SCR (silicon-controlled rectifier). A four-layer pnpn semiconductor that functions like a grid-controlled thyatron.

controller—1. An instrument that holds a process or condition at a desired level or status as determined by comparison of the actual value with the desired value. 2. A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected. 3. A hardware interface that accepts instructions from a computer and reformats them to program an instrument or peripheral.

controller function—Regulation, acceleration, deceleration, starting, stopping, reversing, or protection of devices connected to an electric controller.

control-line timing—Clock signals between a modem and a communication-line controller unit.

control link—Apparatus for effecting remote control between a control point and a remotely controlled station.

control locus—A curve that shows the critical value of grid bias for a thyatron.

control operator—An amateur radio operator designated by the licensee of an amateur radio station to also be responsible for the emissions from that station.

control panel—A panel having a systematic arrangement of terminals used with removable wires to direct the operation of a computer or punched-card equipment.

control point—1. A point that may serve as a reference for all incremental commands. 2. The operating position of an amateur radio station where the control operator's function is performed.

control-power disconnecting device—A disconnective device, such as a knife switch, circuit breaker, or pullout fuse block, used for the purpose of connecting and disconnecting the source of control power to and from the control bus or equipment.

control program—A computer program that places another program and its environment in core memory in proper sequence and retains them there until it has finished operating.

control ratio—1. The ratio of the change in anode voltage to the corresponding change in critical grid voltage of a gas tube, with all other operating conditions maintained constant. 2. Also called programming coefficient. The required range in control resistance of a regulated power supply to produce a 1-volt change in output voltage. Expressed in ohms per volt.

control read-only memory—Abbreviated CROM. A major component in the control block of some microprocessors. It is a ROM that has been microprogrammed to decode control logic.

control rectifier—A silicon rectifier capable of switching or regulating the flow of a relatively large amount of power through the use of a very small electrical signal. These solid-state devices can take the place of mechanical and vacuum tube switches, relays, rheostats, variable transformers, and other devices used for switching or regulating electric power.

control register—Also called instruction register. In a digital computer, the register that stores the current instruction governing the operation of the computer for a cycle.

control section—See control unit.

insertion gain — instruction length

their surface finish, and the rigidity of their mountings, the required mechanical insertion force will be dictated to a great extent by the life expectancy of the connectors, the intended use, the speed of insertion, and their immunity to shock and vibration. 2. The effort, usually measured in ounces, required to engage mating components.

insertion gain—The gain resulting from the insertion of a transducer in a transmission system is the ratio of the power delivered to that part of the system following the transducer to the power delivered to that same part before insertion. (If more than one component is involved in the input or output, the particular component used must be specified. This ratio is usually expressed in decibels.)

insertion loss—1. The difference between the power received at the load before and after the insertion of apparatus at some point in the line. 2. The loss in load power resulting from the insertion of a component, connector, or device. Insertion loss is expressed in decibels as the ratio of power received at the load before insertion to the power received at the load after insertion. 3. Signal-power loss resulting from connecting communication equipment with dissimilar impedance values. 4. A power loss that results from inserting a component into a previously continuous path or creating a splice in it.

insertion phase shift—The change in phase of an electric structure when inserted into a transmission system.

insertion switch—A process by which information is inserted into a computer by the manual operation of switches.

insertion tool—A small, hand-held tool used to insert contacts into a connector.

inside lead—See start lead.

inside spider—A flexible device placed inside a voice coil to center it with the pole pieces of a speaker.

in-situ tester—See in-circuit tester.

inspection chamber—In a spectrophotometer, the part in which the solution to be tested is placed for analysis.

inspectoscope—An instrument for viewing quartz crystals, while they are immersed in oil, to determine mechanical faults, the approximate direction of the optical axis, and regions of optical twinning.

instability—1. The measure of the fluctuations or irregularities in the performance of a device, system, or parameter. 2. An undesired change that occurs over a period of time and that is not related to input, operating conditions, or load.

instantaneous automatic gain control—Abbreviated instantaneous AGC. A portion of a radar system that automatically adjusts the gain of an amplifier for each pulse so that there is a substantially constant output-pulse peak amplitude with different input-pulse peak amplitudes. The circuit is capable of acting during the time in which a pulse is passed through the amplifier.

instantaneous companding—Companding that varies the effective gain in response to instantaneous values of the signal wave.

instantaneous contacts—Contacts that are actuated immediately when a starting signal is applied to a timer.

instantaneous disc—A blank recording disc that can be played back on a phonograph immediately after being cut on a recorder.

instantaneous frequency—The rate at which the angle of a wave changes when the wave is a function of time. If the angle is measured in radians, the frequency in hertz is the rate of change of the angle divided by 2π .

instantaneous overcurrent relay—Also called rate-of-rise relay. A device that functions instantaneously on an excessive value of current or on an excessive rate

of current rise, thus indicating a fault in the apparatus of the circuit being protected.

instantaneous power—The power at the points where an electric circuit enters a region. It is equal to the rate at which the circuit is transmitting electrical energy into the region.

instantaneous power output—The rate at which energy is delivered to a load at a particular instant.

instantaneous readout—Readout by a radio transmitter at the instant the information to be transmitted is computed.

instantaneous recording—A recording intended for direct reproduction without further processing.

instantaneous sampling—The process of obtaining a sequence of instantaneous values of a wave. These values are called instantaneous samples.

instantaneous sound pressure—The total instantaneous pressure at a certain point, minus the static pressure at that point. The most common unit is the microbar.

instantaneous speech power—The rate at which the speaker is radiating sound energy at any given instant.

instantaneous speed variations—See ISV.

instantaneous start-stop rate—The maximum stepping rate that can be attained by an unloaded stepper motor from a standstill without losing synchronism with the field and without overshooting to the next step when coming to a stop.

instantaneous value—1. The magnitude, at any particular instant, of a varying value. 2. The value of voltage or current at a particular instant. If the selected instant is the time when the polarity of the waveform changes, this value will be zero.

instruction—1. Information that, when properly coded and introduced as a unit into a digital computer, causes the computer to perform one or more of its operations. All instructions commonly include one or more addresses. 2. A binary code applied to a logic circuit to affect its mode of operation. 3. A statement that specifies an operation and the values or locations of its operands. In this context, the term *instruction* is preferable to the terms *command* or *order*, which are sometimes used synonymously. 4. A set of bits that defines a computer operation and is a basic command understood by the CPU. It may move data, do arithmetic and logic functions, control I/O devices, or make decisions as to which instructions to execute next. 5. In a computer, a single order within a program. This order will be fetched from memory, decoded, and executed by the CPU. Instructions may be arithmetic or logical, and operate on registers, memory, I/O devices, or specify control operations. A sequence of instructions is a program. 6. A machine-language command executed by the microprocessor in a computer system.

instructional constant—Also called pseudoinstruction. In a computer, data stored in the program or instructional area that will be used only as a test constant.

instruction code—The list of symbols, names, and definitions of the instructions that are intelligible to a given computer or computing system.

instruction counter—A multiple-bit register that keeps track of the address of the current instruction. See control counter.

instruction cycle—The process of fetching an instruction from memory and executing it.

instruction deck—A set of punched cards containing a symbolic coded program to be read into a computer.

instruction fetch—See fetch.

instruction length—The number of words needed to store an instruction. It is one word in most computers,

UNIX—A complex and powerful multiuser computer operating system written in the C language originally developed, marketed, and trademarked by AT&T. It needs a computer with a large amount of RAM (random-access memory or storage capacity). UNIX allows a computer to handle multiple users and programs simultaneously and has TCP/IP built-in. It is the most common operating system for servers on the Internet. It also allows software to be moved (known as porting) to computers of different sizes or types. UNIX is available in several related versions.

unload—In a computer: 1. To remove the tape from the columns of a recorder by raising or lowering the recording head. 2. To remove a portion of the address part of an instruction. 3. *See also* dump.

unloaded antenna—An antenna with no added inductance or capacitance.

unloaded applicator impedance (dielectric heaters)—The complex impedance measured at the point of application and at a specified frequency without the load material in position.

unloaded line—A line with no loading coils.

unloaded Q (switching tubes)—Also called the intrinsic Q. The Q of a tube unloaded by either the generator or termination.

unloading amplifier—An amplifier capable of reproducing or amplifying a given voltage signal while drawing negligible current from the voltage source.

unloading circuit—In an analog computer, a computing element or combination of computing elements capable of reproducing or amplifying a given voltage signal while drawing negligible current from the voltage source, thus decreasing the loading errors.

unmodulated—Having no modulation; e.g., a carrier that is transmitted during moments of silence in radio programs, or a silent groove in a disc recording.

unmodulated groove—Also called a blank groove. In mechanical recording, the groove made in the medium with no signal applied to the emitter.

unoriented—A structure in which the crystallographic axes of the grains of a metal are not aligned to give directional magnetic properties.

unpack—In a computer, to separate combined items of information, each into a separate machine word.

unsaturated logic—A form of logic containing transistors operated outside the region of saturation; for example, current-mode logic (CML) and emitter-coupled logic (ECL).

unserved energy—The amount of energy not delivered as a result of an equipment outage.

untuned—Not resonant at any of the frequencies being handled.

unusable samples—In random-sampling-oscilloscope technique, those samples not falling within the time window.

unweighted noise—The measured noise level in electronic equipment, with a measuring device that is sensitive to a wide range of frequencies that extend beyond the audible spectrum.

unwind—In a computer, to code all the operations of a cycle, at length and in full, for the express purpose of eliminating all red-tape operations.

UPC—Abbreviation for universal product code. A product identification system designed to assign a unique number to every product in distribution. A 10-digit bar code, with the first 5 digits identifying the manufacturer, the second 5 identifying the item. Each digit is represented by the ratio of the widths of adjacent stripes and white areas. Used with optical checkout scanning devices that retrieve item price from a computer.

upconverter—1. A device that increases the frequency of a transmitted signal. 2. A type of parametric amplifier that is characterized by the frequency of the output signal being greater than the frequency of the input signal.

update—1. To search a file (such as a particular record in a computer tape) and select one entry, then perform some operation to bring the entry up-to-date. 2. In a computer, to modify an instruction so that the address numbers in it are increased by a specified amount each time the instruction is executed. 3. Generally applied to computer files in which records are added, deleted, or amended to ensure that the latest information is contained in the file.

update-response time—The interval between the entry of new data into a system and the display of that data.

updating—The act of bringing information up to the current value.

up/down counter—Also called reversible counter. A counter with the capability of counting in an ascending or descending order, depending on the logic present at the up/down inputs.

uplink—1. An rf link from a site on the earth or from an aircraft to a satellite. 2. The earth-to-geosynchronous satellite microwave link and related components, such as earth station transmitting equipment. The satellite contains an uplink receiver; uplink components in the earth station are involved with the processing and transmission of signals to the satellite. 3. The communications path from the earth to the satellite. 4. The earth station electronics and antenna that transmit information to a communication satellite for relay back to the ground.

upload—1. The process of transferring communications instructions or data from terminals, including PCs, into a mainframe or host computer system. 2. To send a file from one computer to another via modem or other telecommunication method. *See also* download.

upper operating temperature—The maximum temperature to which a material can be subjected and still maintain specified operating characteristics within limits.

upper sideband—1. The higher frequency or group of frequencies produced by an amplitude-modulation process. 2. In carrier transmission, the band of frequencies that is higher than the carrier frequency. It is the sum of the instantaneous values of the carrier frequency and the modulating frequency.

upset-duplex system—A direct-current telegraph system in which a station between any two pieces of duplex equipment may transmit signals by opening and closing the line circuit and thereby upsetting the duplex balance.

upset welding—A resistance-welding process wherein the weld is made simultaneously over the entire area of abutting surfaces or progressively along the joint with the aid of rolls or clamps that force the abutting surfaces together. The pressure is applied before heating starts and is maintained throughout the heating period.

up time—1. The time during which an equipment is either operating or available for operation, as opposed to down time, when no productive work can be accomplished. 2. That element of active time during which an item is either alert, reacting, or performing a mission.

up-time ratio—The quotient of up time divided by up time plus down time.

urea plastic material—A thermosetting plastic material, with good dielectric qualities, used for radio-receiver cabinets, instrument housing, etc.

urgency—The degree to which a process requires attention; determined by the process's priority.